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CONDUCTING PLUG TARGET AND METHOD OF MAKING THE SAME

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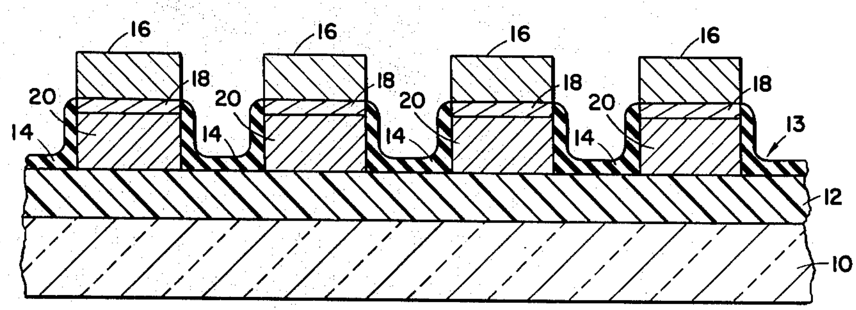

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CONDUCTING PLUG TARGET AND METHOD OF MAKING THE SAME

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This invention relates to conducting plug targets and more specifically to a target structure having particular applicability to television pickup electron discharge devices and a method of making the target structure.

One type of television pickup device is known as an image orthicon. As broadly defined, an image orthicon is a camera tube in which an electrical image is produced by a photo-emitting surface and focused on a separate storage target, which target is scanned on its opposite side by a low velocity electron beam.

In this instance, the front side of the image orthicon tube is a transparent plate upon which an optical image is focused. On the inside of the front plate there is usually a photocathode that releases electrons in direct proportion to the brightness of the image projected thereon. These photoelectrons are accelerated and focused on the target so as to create a charge pattern on the target that is also in direct proportion to the brightness of the image.

The prior art targets capacitively couple the image charge to the other side of the target. It therefore requires that the target material have a low lateral resistivity to prevent leakage of the image charge across the face and must also be thin enough to provide good coupling of the image charge to the scanning side of the target.

To avoid the need for thin, very fragile glass discs of the order of 5 to 10 wavelengths of light thickness as presently used in the art, I propose to utilize a target that is made of insulating material having conducting plugs extending from one side of the target to the other to directly couple the signals on one side of the target to the scanning beam which is on the other side thereof.

I have found that certain thin metal films which have been oxidized or fluoridized are particularly tough and flexible and allow repeated handling during the process of manufacture and, in addition, makes an excellent dielectric film useful as a target in a storage device.

It is, therefore, a principal object of the present invention to provide a durable target structure.

It is another object of the present invention to provide a target structure having a required dielectric constant.

It is still another object of the present invention to provide a target structure that is capable of being easily reproduced on a mass produced scale.

The features of my invention which I believe to be novel are set forth with particularity in the appended claims. The invention itself, however, both as to its organization and method of operation, together with further objects and advantages thereof, may best be understood by referring to the following description taken in conjunction with the accompanying drawing in which the figure represents an exaggerated, partial cross-sectional view of the target structure of my invention immediately after being formed by one of the processes hereinafter described.

Referring now to the drawing, there is shown my novel target mounted on a suitable support member **10** which may serve as a support to carry on the steps of my process. Support member **10** has a strippable lacquer base substrate **12** mounted thereon. The surface of base **10** on which substrate **12** is mounted is optically flat and smooth for ease in subsequent stripping. Deposited on the substrate **12** is a plurality of spaced dots or islands **20**, which islands are noted by their lack of chemical reaction in that they are not capable of being oxidized or fluoridized. Deposited over the dots **20** and the substrate **12** is a continuous film generally designated as **13** and composed of sections **14** and **18** (thickness 200–20,000 A.). This film **13**, in its initial state, is a metallic substance that is noted for its ability to become oxidized and fluoridized and thus exhibit dielectric properties. A second set of dots or islands **16** is deposited on those portions of film **13** which are in registry with prior dots **20**.

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Having formed these islands or dots with an intermediate oxidizable layer, I have found that if the exposed portions **14** of film **13** are now fluoridized or oxidized completely, those areas **14**, which lie outside the bounds of dots **16** and **20**, will now exhibit dielectric properties. Those areas of film **13** which lie between dots **16** and **20**, namely portions **18**, will still retain their conducting capabilities since they have not been exposed to the fluoridation or oxidation means and, therefore, have not had an opportunity to become dielectric. Thus, I am able to produce a thin membrane of insulating material that is pierced by continuous metallic islands.

Base member **10**, while shown as glass is required to have a surface that is optically flat and smooth. While this has been depicted as glassy material, it will be obvious to those skilled in the art that other materials may also be used provided that they meet the requirements of flatness.

On the flat surface of supporting structure **10** the strippable substrate **12** is placed and may consist of any strippable film material. I have found that a lacquer base film, for example, cellulose nitrate or polystyrene, is admirably suited for this type of operation. It should be understood that substrate **12** should be of uniform thickness and should be easily stripped from both the supporting surface and the target itself. A plurality of dots **20** is deposited on film **12** and may be formed by evaporating nonoxidized material through a foraminous mask (not shown) which is capable of being replaced in exact registry for a subsequent operation. The dots **20** may be deposited in any thickness ranging from about 2,000 to 20,000 angstroms. The dots **20** may be applied by either spraying or evaporating the material through the mask. The mask is then removed and a uniform layer **13** of either aluminum or copper or any other readily oxidizable or fluoridizable material may be deposited over the dots **20** and substrate **12**. The foraminous mask is then replaced so that the openings therein are in exact registry with the prior dots **20**, and dots **16** are then deposited.

To complete the process, the entire assembly is then dipped or placed in an oxidizing or fluoridizing atmosphere whereupon the exposed portions **14** of film **13** are completely oxidized or fluoridized and become dielectric. The completed target assembly may now be stripped from substrate **12** and applied as a target electrode in a suitable storage tube.

As an alternative method or process of manufacturing my novel target assembly, I have found that it is also possible to strip the assambly from base member **12** after the dots **16** have been applied. By so doing, the fluoridizing or oxidizing process may be hastened since the fluoride or oxide may be applied from both sides and thereby insure a greater penetration and a noticeable shortening of the time required to oxidize or fluoridize film **13**.

By performing the above steps, I am able to produce sections **14** which exhibit dielectric characteristics while sections **18** are still highly conductive since they have not been exposed to the dielectric forming step.

I have found that gold, platinum, chromium, rhodium, and nickel are very well suited for use as dots or islands **16** and **20**. However, I do not wish to be so limited since it will be obvious to those skilled in the art that various other nonoxidizable metals may be used in place thereof.

While there have been described what are presently considered the preferred embodiments of my invention, it will be obvious to those skilled in the art that various other changes and modifications may be made therein without departing from the inventive concept, and it is aimed in the appended claims to cover all such changes and modifications as fall within the true spirit and scope of this invention.

What I claim is:

1. A method of forming a target structure comprising the steps of forming a first plurality of chemically nonreactive conductors, depositing a chemically reactive continuous film over the first plurality of conductors, depositing a second plurality of chemically nonreactive conductors on the film in registry with the first plurality of conductors and chemically treating the exposed portions of the film to convert the exposed portions to a dielectric.

2. The method of claim **1** wherein the nonreactive conductors comprise metallic portions selected from the group consisting of gold, platinum, rhodium, chromium and nickel.

3. The method of claim **2** wherein the chemically reactive film is converted to a dielectric by treatment with a chemical from the group consisting of oxides and fluorides.

4. The method of claim **3** wherein the chemically reactive layer comprises a metallic film selected from the group consisting of aluminum and copper.

5. A target structure for the storage of electrical charges, comprising a continuous metal film, and a plurality of discreet spaced conductive metal elements on both sides of the metal film, each of the metal elements on one side of the film being located in register with a respective metal element on the other side of the film, the portions of the film located between registering elements being electrically conductive while the exposed areas of the film surrounding said elements are nonconductive.

6. A target structure according to claim **5** wherein the conductive metal elements are of a chemically nonreactive metal.

7. A target structure according to claim **6** wherein said exposed areas of the film are metal converted to a dielectric.

8. A target structure according to claim **6** wherein the nonreactive metal is selected from the group consisting of gold, platinum, chromium, rhodium and nickel.

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